The tear drop shape of the top surface of the hosel segment **18** is a result of the top wall **16** of the club head crowning above the hosel along a vertical plane extending along the target line through the ball striking point on the face wall. This results in the curvature of the hosel outer wall **20** having a larger radius at portion **34**. Top wall **30** has an angle of about 20 degrees to a horizontal plane and angularly related to a plane perpendicular to hosel axis **40** by about 10 degrees.

It should be noted here what the approximate geometry of the club head and hosel is. The "lie" of the club head is the angle of the hosel axis to ground in a vertical plane perpendicular to the target line and is conventionally about 55 degrees in the driver. The plane of the top surface **30** of the hosel segment **18** and the bottom surface **42** of the ferrule **12** is about 100 degrees clockwise from the axis **40** of the hosel-ferrule.

An important aspect of the present invention is that the top surface **30** of the hosel segment and the bottom surface **42** of the ferrule have a mating area of about 7 times presently known hosel-ferrule mating surfaces. These surfaces are bonded with a two part slow setting, high strength epoxy material, and because of the increased bonding area, produces a higher strength ferrule bond and ferrule that resists lateral or bending forces of the shaft above the hosel to a greater extent than conventional hosels. The present ferrule is constructed of a high strength thermoplastic material and it in effect cushions the lateral forces imposed by the shaft on the ferrule minimizing shaft fracture at the hosel. This enhanced hosel support for the shaft immediately above the hosel and minimizes shaft fracture in the hosel area.

The configuration of the ferrule **12** is generally short in axial extent and replaces in part in that area the desired functions normally attributed to the hosel, and particularly the support function of the hosel and the blending function of the hosel as it merges into the club head top wall.

Generally, this is achieved by configuring the outer surface of the ferrule at its lower extent with an outward flare that varies in the degree of flare as one moves 360 degrees about the lower outer surface of the ferrule to achieve a complementary configuration to the outer surface of the reduced height hosel. The ferrule has an upper annular portion **44** having an outer diameter approximating conventional ferrules. From that upper portion, however, the outer surface **22** of the ferrule has a first transition portion **50** in the direction of portion **44** in the plane of FIG. **7**, of about 30 degrees with respect to the hosel axis. Surface **22** has a second lower transition portion **51** also in the same plane, of about 45 degrees with respect to the hosel axis **40**.

The transition portions **50** and **51** are at the hosel point portion **34**. The other transition curvature portions on surface **22** as one moves around the perimeter of the lower portion of the ferrule as it blends into the hosel surface **20**, have different curvatures than portions **50** and **51** to achieve the blending into the top wall depending on specific club head designs. It should also be understood that head and hosel shape may vary from club to club and that transition portions **50** and **51** may have somewhat more or less curvature than noted above.

I claim:

1. A golf club head with a shortened hosel and ferrule, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be redistributed in the club head including a hosel in the golf club head having a top surface that is substantially coplanar with the top surface of the top wall, a

ferrule mounted on the hosel top surface adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into a plane of and the upper surface of the top wall adjacent the hosel, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is tangent to the upper surface of the top wall adjacent the hosel.

2. A golf club head as defined in claim 1, wherein the hosel extends below the upper surface of the top wall of the club head less than 0.75 inches.

3. A golf club head as defined in claim 1, wherein the hosel top surface projects above the upper surface of the top wall a distance less than 0.200 inches.

4. A golf club head as defined in claim 1, wherein the outer surface of the hosel at the top surface thereof flares outwardly from the hosel axis and has no portion thereof parallel to the hosel axis.

5. A golf club head as defined in claim 1, wherein the outer surface of the ferrule adjacent the bottom thereof flares outwardly at an angle of less than 45 degrees with respect to a plane perpendicular to the hosel axis.

6. A golf club head as defined in claim 1, wherein the outer surface of the hosel adjacent the top surface thereof flares outwardly to blend into the top surface of the top wall of the club head.

7. (Amended) A golf club head with a shortened hosel and ferrule, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be distributed in the club head including a hosel in the golf club head having a top surface that is substantially coplanar with the top surface of the top wall, a ferrule mounted on the hosel top surface adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the plane of and the upper surface of the top wall, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower [and] <u>end</u> is tangent to the upper surface of the top wall adjacent the hosel, said ferrule having a lower substantially flat surface at the lower large diameter portion, said hosel having a top surface substantially greater in outer [perimeter] <u>diameter</u> than the hosel bore and complementary to the lower surface of the ferrule, thereby creating large mating surfaces on the ferrule and hosel, and a bonding agent on the mating surfaces on the ferrule and the hosel, whereby the ferrule has an increased ability to support the club shaft in a direction perpendicular to the hosel axis.

8. A golf club head with a shortened hosel and extended hosel as defined in claim 7, wherein the hosel has an axial length less than 0.750 inches.

9. (Amended) A golf club head with a shortened hosel and extended ferrule, comprising: a golf club head having a ball striking wall and a top wall extending rearwardly from the ball striking wall, a hosel projecting upwardly from the top wall having a bore therethrough with an axis and with a diameter about 0.334 inches, said hosel extending upwardly from the top wall a distance less than 0.250 inches, said hosel having a top surface that is substantially planar and having portions thereof that extend outwardly from the hosel axis substantially more than 0.250 inches to increase the area of the top surface of the hosel, and a ferrule mounted on top of the hosel having a lower surface that is substantially equal in area to the enlarged area of the top surface of the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the plane of the upper surface of the top wall, said ferrule having an outer surface that curves outwardly [form] <u>from</u> the upper portion to the lower portion sufficiently so its lower end is tangent to the upper surface of the top wall adjacent the hosel.

10. (Amended) A golf club head, comprising: a golf club head having a ball striking wall and a top wall extending rearwardly from1 the ball striking wall, a hosel projecting upwardly from the top wall having a bore therethrough with an axis with a diameter about 0.334 inches, said hosel extending upwardly from the top wall a distance less than 0.250 inches, said hosel having a top surface that is substantially planar and having portions thereof that extend outwardly from the hosel axis substantially more than 0.250 inches to increase the area of the top surface of the hosel, a ferrule constructed of a light-weight synthetic material, said ferrule having a bore therethrough adapted to receive a golf club shaft, said ferrule having outer surface at an upper portion thereof that is circular and closely adjacent the ferrule bore, said outer surface of the ferrule curves outwardly from the upper portion to the lower portion sufficiently so its lower end is tangent to the upper surface of the top wall adjacent the hosel.

11. A ferrule for a golf club head as defined in claim 10, wherein the ferrule has a lower surface adapted to engage an upper surface of the hosel on an associated club head, said lower surface having an average diameter substantially greater than 0.4375 inches.

12. A golf club head with a shortened hosel, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be redistributed in the club head including a hosel in the golf club head having a top surface substantially coplanar with the top wall and projecting below the top wall with a bore therein, said hosel having an axial length downwardly from the top surface of the hosel less than 0.75 inches, and a ferrule mounted on the hosel top surface adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the plane of the upper surface of the top wall, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is tangent to the upper surface of the top wall adjacent the hosel.

13. A golf club head as defined in claim 12, wherein the hosel extends below the top surface of the hosel about 0.625 inches.

14. A golf club head as defined in claim 12, wherein the hosel top surface projects above the upper surface of the top wall a distance less than 0.200 inches.

15. A golf club head as defined in claim 14, wherein the outer surface of the hosel at the top surface thereof flares outwardly from the hosel axis and has no portion thereof parallel to the hosel axis.

16. A golf club head with a shortened hosel and ferrule, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be distributed in the club head including a hosel in the golf club head, a ferrule mounted adjacent the hosel adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the upper surface of the top wall adjacent the hosel, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is tangent to the upper surface of the top wall adjacent the hosel.

17. A golf club head with a shortened hosel and ferrule, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be distributed in the club head including a hosel in the golf club head, a ferrule mounted adjacent the hosel adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the upper surface of the top wall, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is tangent to the upper surface of the top wall adjacent the hosel, said ferrule having a lower surface at the lower large diameter portion, said hosel having a surface substantially greater in outer diameter than the ferrule upper diameter portion and complementary to the lower surface of the ferrule, thereby creating large mating surfaces on the ferrule and hosel, and a bonding agent on the mating surfaces on the ferrule and the hosel, whereby the ferrule has an increased ability to support the club shaft in a direction perpendicular to the hosel axis.

18. A golf club head with a shortened hosel, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be redistributed in the club head including a hosel in the golf club head projecting below the top wall with a bore therein, said hosel having an axial length downwardly from the top surface of the hosel less than 0.75 inches, and a ferrule mounted adjacent the hosel adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the plane of the upper surface of the top wall, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is tangent to the upper surface of the top wall adjacent the hosel.

19. A golf club head with a shortened hosel and ferrule, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be distributed in the club head including a hosel in the golf club head, a ferrule mounted adjacent the hosel adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the upper surface of the top wall adjacent the hosel, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is substantially tangent to the upper surface of the top wall adjacent the hosel.

20. A golf club head with a shortened hosel and ferrule, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be distributed in the club head including a hosel in the golf club head, a ferrule mounted adjacent the hosel adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the plane of and the upper surface of the top wall, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is substantially tangent to the upper surface of the top wall adjacent the hosel, said ferrule having a lower surface at the lower large diameter portion, said hosel having a surface substantially greater in outer diameter than the ferrule upper diameter portion and complementary to the lower surface of the ferrule, thereby creating large mating surfaces on the ferrule and hosel, and a bonding agent on the mating surfaces on the ferrule and

the hosel, whereby the ferrule has an increased ability to support the club shaft in a direction perpendicular to the hosel axis.

21. A golf club head with a shortened hosel and extended ferrule, comprising: a golf club head having a ball striking wall and a top wall extending rearwardly from the ball striking wall, a hosel projecting upwardly from the top wall having a bore therethrough with an axis and with a diameter about 0.334 inches, said hosel extending upwardly from the top wall a distance less than 0.250 inches, said hosel having a top surface that is substantially planar and having portions thereof that extend outwardly from the hosel axis substantially more than 0.250 inches to increase the area of the top surface of the hosel, and a ferrule mounted on top of the hosel having a lower surface that is substantially equal in area to the enlarged area of the top surface of the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the plane of the upper surface of the top wall, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is substantially tangent to the upper surface of the top wall adjacent the hosel.

22. A golf club head, comprising: a golf club head having a ball striking wall and a top wall extending rearwardly from1 the ball striking wall, a hosel projecting upwardly from the top wall having a bore therethrough with an axis with a diameter about 0.334 inches, said hosel extending upwardly from the top wall a distance less than 0.250 inches, said hosel having a top surface that is substantially planar and having portions thereof that extend outwardly from the hosel axis substantially more than 0.250 inches to increase the area of the top surface of the hosel, a ferrule constructed of a light-weight synthetic material,

said ferrule having a bore therethrough adapted to receive a golf club shaft, said ferrule having outer surface at an upper portion thereof that is circular and closely adjacent the ferrule bore, said outer surface of the ferrule curves outwardly from the upper portion to the lower portion sufficiently so its lower end is substantially tangent to the upper of the top wall adjacent the hosel.

23. A golf club head with a shortened hosel, comprising: a golf club head including a ball striking face and a top wall, means to reduce club head weight and permit the saved weight to be redistributed in the club head including a hosel in the golf club head having a top surface substantially coplanar with the top wall and projecting below the top wall with a bore therein, said hosel having an axial length downwardly from the top surface of the hosel less than 0.75 inches, and a ferrule mounted on the hosel top surface adapted to surround and finish a shaft inserted into the hosel, said ferrule having an upper small diameter portion and a lower large diameter portion to blend into the plane of the upper surface of the top wall, said ferrule having an outer surface that curves outwardly from the upper portion to the lower portion sufficiently so its lower end is substantially tangent to the upper surface of the top wall adjacent the hosel.